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IN THE

# SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1940.

No. 9.

THE SCHRIBER-SCHROTH COMPANY,

Petitioner,

vs.

THE CLEVELAND TRUST COMPANY,
CHRYSLER CORPORATION,

Respondents.

No. 10.

THE ABERDEEN MOTOR SUPPLY CO.,

Petitioner,

vs.

THE CLEVELAND TRUST COMPANY,
CHRYSLER CORPORATION,

Respondents.

No. 11.

THE F. E. ROWE SALES CO.,

Petitioner,

vs.

THE CLEVELAND TRUST COMPANY,
CHRYSLER CORPORATION,

Respondents.

## SUPPLEMENT TO PETITIONERS' BRIEF.

**Decisions by the Circuit Court of Appeals for the Sixth Circuit and by This Court in the Above Causes.**

JOHN H. BRUNINGA,
JOHN H. SUTHERLAND,
Attorneys for Petitioners.

August 31, 1940.

St. Louis Law Printing Co., 415 North Eighth Street. CEntral 4477.

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**FIRST DECISION OF THE COURT OF APPEALS,**

**92 FED. (2d) 330.**

**Nos. 7223-4-5**

# UNITED STATES CIRCUIT COURT OF APPEALS

SIXTH CIRCUIT

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THE CLEVELAND TRUST COMPANY, CHRYSLER CORPORATION, *Appellants,*

No. 7223 v.

THE SCHRIBER-SCHROTH COMPANY, *Appellee.*

THE CLEVELAND TRUST COMPANY, CHRYSLER CORPORATION, *Appellants,*

No. 7224 v.

THE ABERDEEN MOTOR SUPPLY COMPANY, *Appellee.*

THE CLEVELAND TRUST COMPANY, CHRYSLER CORPORATION, *Appellants,*

No. 7225 v.

THE F. E. ROWE SALES COMPANY, *Appellee.*

APPEALS from the District Court of the United States for the Northern District of Ohio, Eastern Division.

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Decided October 8, 1937.

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Before HICKS, SIMONS and ALLEN, Circuit Judges.

SIMONS, Circuit Judge. In a study of the patents and prior art involved in *Waukesha Motor Co.* v. *Willys Overland, Inc.*, 77 Fed. (2d) 906, and *The Perfect Circle Co.* v. *Hastings Mfg. Co.*, 88 Fed. (2d) 813, we learned something of the principles of operation and the mechanics employed in the conventional four-cycle internal combustion engine of the modern motor car. It will

therefore be unnecessary here to repeat what was there said in reference thereto. In the first we considered the explosion chamber, and in the second the piston ring. In the present infringement suit we deal with the piston.

In the rapid reciprocation of a piston within the cylinder, as in the references described, the desirability of maintaining a close fit was obvious and had long been recognized. This was necessary to avoid waste of power through gases being permitted to pass below the piston from the explosion chamber, a condition known as "blow-by," to prevent lubricating oil passing above the piston into the explosion chamber, a condition known as "pumping oil," and to prevent the slapping of the piston in the cylinder, making for a noisy engine and tending to break its parts. On the other hand a too close fit would, because of the expansion of the piston by the great heat generated in the cylinder, cause it to bind or "seize" therein, thus stalling the engine or perhaps even wrecking it.

Cylinders were and generally still are cast of iron, and prior to the period we are here considering pistons were likewise so cast. The disadvantages in this organization were early recognized. Since iron is a poor conductor of heat, the particles of carbon that would form on the cylinder head would become overheated and cause premature explosion in the combustion chamber. Iron is also heavy, and with the great acceleration of piston reciprocation, due to the ever increasing demand for speed, the industry began to cast about for expedients to lighten the pistons. There were numerous efforts and failures in this respect with the conventional iron trunk piston. Lighter metals were considered, but since strength and durability to withstand the great force of rapid explosions upon the piston head and the powerful thrust imparted to its bearing facts by the power stroke of the piston as it imparted energy to the crank shaft were prerequisites, the art was limited to metal that was both strong and durable. It turned, therefore, quite naturally and inevitably, to aluminum. A new and for a long time seemingly insuperable problem at once confronted the automotive engineers, due to the fact that the coefficient of expansion differs greatly in the two metals, and that under heat aluminum will expand much more rapidly than iron. Since the desirable clearance is minute, approximating one one-thousandth of an inch, it was at once clear that an aluminum piston, installed when cold with required clearance in an iron cylinder, would when heated by operation seize, and that a piston with clear-

ance sufficient to avoid seizing would waste power, pump oil, cause undesirable noises, and lack durability.

Ingenious, numerous and varied were the expedients resorted to in an effort to achieve the clearly recognized advantages of aluminum pistons, while at the same time avoiding troublesome results, and equally numerous were the failures, by reason of which a prejudice had developed in the industry against them, and it was said they had had a "black eye."

The Cleveland Trust Company, appellant, is the repository of numerous patent rights assigned to it by inventors and by piston and automobile manufacturers, and it is its contention that the aluminum piston problem was completely solved by some of its assignors, and that a structure embodying the disclosures of the patent to Jardine, No. 1,763,523, granted June 10, 1930, but in a more specific and improved form described in Maynard No. 1,655,968, granted January 10, 1928, but on an application later than Jardine's, had gone into wide commercial use, being accepted by the industry, with the exception of some divisions of the General Motors Corporation, had sold in the tens of millions, and is now infringed by pistons of the appellees. The Jardine and Maynard patents belong to the Trust Company. Conceiving, however, that a Gulick application, which was being prosecuted by the Packard Motor Car Company, would, with its broader claims, dominate both Jardine and Maynard, the Trust Company purchased it and prosecuted it to successful conclusion after numerous interferences, the patent issuing as Gulick No. 1,815,733, on July 21, 1931. The Trust Company also owns Schmiedeknecht patent No. 1,256,265, granted February 12, 1918, and Mooers, No. 1,402,309, granted January 3, 1922, both for pistons, and seven accused devices are all alleged to infringe some of the claims of some or all of the five patents.

The appellees are three Cleveland dealers who have sold alleged infringing pistons manufactured by the Sterling Products Corporation of St. Louis, Missouri. While the manufacturer was named in the original bills of complaint, they were dismissed as to it, it being understood, however, that Sterling Products Corporation was conducting the defense of the three suits. By stipulation they were consolidated below, and all are before this court upon the same record. At the outset only two alleged infringing devices were involved, one a Sterling piston known as Exhibit 1, and the other a Ray-Day piston known as Exhibit 8. During the progress of the trial five additional structures were introduced as infringements. While there is no finding to that effect, it

seems to have been assumed that all of the alleged infringing devices were sold by each of the three defendants. The consolidated cause was referred to a master, whose very detailed findings of fact and conclusions of law were affirmed by the District Judge without discussion and decrees entered dismissing the bills. While the Chrysler Corporation appears as party plaintiff below and as co-appellant here, it has never entered its appearance and its presence in the case as a nominal plaintiff is due to the fact that it owns a half interest in the Maynard patent and was therefore joined as party plaintiff. An issue raised below as to the propriety of Chrysler being made a nominal party is abandoned here, since the defendants have not appealed.

The controversy is involved and has been bitterly fought. The record is voluminous, the exhibits, physical and otherwise, numerous, the patent office history discloses persistent challenge, and of eighty-odd claims fifty-two are said to be infringed. While we have given careful consideration to the briefs and record, it is manifest that the necessities of the case and the desirable limit of an opinion will permit us to discuss only the more salient features of the controversy, with perhaps summary disposition of its lesser issues, for the challenge to the validity of the patents and to the fact of their infringement includes most if not all of the defenses known to the patent law.

We deal first with the patent to Gulick, in agreement with the contention that if valid it is basic. Gulick had been connected with various motor car and motor cycle manufacturing companies in a number of capacities, including that of factory manager. He was also an inventor, having prosecuted some fifty applications in the patent office. As early as 1908 he had a conception of a split and flexible piston, but did nothing more for several years than to make sketches. In 1911 he made some experiments with modified standard iron pistons, giving them block tests in a motor cycle and in an Excelsior motor. The motor was later put into a Renault car and given a substantial road test. These early pistons were scrapped. In 1914 he made his first test with aluminum pistons in an Amplex car, which he used personally for some 4500 to 5300 miles. In 1917, along with other patents and patent applications, Gulick assigned his inchoate rights to the Packard Motor Car Company, and the application for the piston patent was filed by it on November 30th of that year. There followed long discussions with the examiners, administrative reviews, bitterly contested interferences, and appeals to the Court

of Appeals of the District of Columbia (*Long* v. *Gulick*, 17 Fed. [2d] 686), and to the Court of Customs and Patent Appeals (*Hartog* v. *Long*, 47 Fed. [2d] 369). There had also been amendments to the original application at the instance of the inventor's assignee. It was not until July 21, 1931, that the Gulick patent issued with its forty-three claims.

The Gulick patent is for a combination of elements, many, if not indeed all of which, are to be found in the prior art. Nowhere, however, is found his precise organization, and the question at once presents itself as to whether there was exercise of the inventive faculty in the concept of their combination, for that a new result was achieved and a new mode of operation of an aluminum piston in its iron cylinder brought about is not successfully challenged on this record. Gulick separated the smaller ring carrying head of the piston from the somewhat larger skirt by a groove or air gap. This tends to prevent the passage of heat from the head directly to the skirt and permits the bearing faces of the skirt to yield to pressure independently of the head. The wrist pin bosses are pulled inwardly from the skirt periphery and instead of being supported by the skirt are carried from the piston head by depending flanges, thus providing a vertically rigid support for the bosses with freedom of lateral motion in a direction at right angles to the load thrusts on the piston. The surface of the skirt where the bosses are connected to the head in conventional pistons was cut away or relieved, so that the bosses are not directly constrained by the cylinder wall. They are held in place by webs extending in the general direction of load thrusts on the piston. One bearing face of the skirt is slotted vertically from the bottom edge up to and connecting with the air gap. That Spillman and Mooers patent 1,092,870, and Franquist patent 1,153,902 showed air gaps between piston head and skirt, or that splitting the piston skirt vertically or combining the vertical and longitudinal splits into the so-called T-slot were old practices, is not conclusive on the question of invention.

Since the cylinder head is the first to heat, and becomes hotter than the skirt it had always been machined with greater clearance, the control of oil and gas flow being taken care of in part at least by the piston rings, which function as a packing. See *Perfect Circle Co.* v. *Hastings*, supra. The problem of maintaining a close fit between an aluminum piston and an iron cylinder without seizing under heat expansion is a problem involving the skirt, which guides the piston and carries the bearings for the

wrist pin, upon which is exerted the thrusts of the connecting rod through the cycle of reciprocation. To decelerate the flow of heat from piston head to skirt by an air gap was perhaps an obvious expedient in the art. To slit the skirt vertically so that pressure of the cylinder wall would compensate for thermal expansion was perhaps not beyond expected skill in the art. Minute relief of the cylinder periphery in the region of the bosses was shown in Franquist. But to combine insulation of head from skirt, retraction of the bosses from the skirt periphery, connection of such bosses to the skirt with webs laterally flexible and yet so carried from the head as to support the load upon the wrist pin with sufficient strength and rigidity, and to utilize the mechanical force of the cylinder wall upon the skirt and the thermal expansion of the bosses so as to compensate evenly and fully for head expansion and to secure a balanced flexibility of the skirt with no bending concentration at any point therein, discloses, we think, a meritorious concept beyond the reach of those skilled in the art. Franquist, of course, does disclose the broad concept of a flexible skirt. But Franquist gives no hint at all of the Gulick invention. His flexibility was obtained by grooves on the accordion principle, which while they interrupted the outer periphery of the piston skirt, did not destroy its inner unity. Some flexibility no doubt it had, but certainly not in the sense that Gulick disclosed it, and it is doubtful that the Franquist piston could have met the severe tests required by the industry. And of commercial history it has none upon this record.

Probably the most difficult task that confronts a patent court lies in determining whether there is invention in a combination whereof many or all cooperating elements are old, and when concepts, however remarkable when disclosed, have in a rapidly developing art already become commonplace, not only to the expert but to the unskilled. It is not easy after the lapse of years to evaluate advances with the "eye and the understanding" of those in the field when they were made. Inventive concept is an abstraction impossible to define, and so courts have sought for simple rules by which its presence may be detected. These have proved helpful, even though never absolute. Long recognition of an existing problem in any art, and the advantages to accrue to an industry from its solution, coupled with repeated failures to find solution, has ever been considered as highly persuasive of invention when success is finally attained. Sometimes achievement is revolutionary, an abandonment of all previous approaches, and the charting of a

new way to the goal. More often the inventor begins where others leave off, and perceives the vital forward step to which predecessors had been blind. Even then success may not be fully recognized until the world gives acclaim.

The present record is conclusive of the long unsuccessful search for a light weight piston sufficiently durable to obviate the well-known disadvantages of the iron trunk piston in high speed engines. There was much research and experimentation by those most highly skilled, including the engineers of the Aluminum Company, Colonel Vincent of the Packard Motor Car Company, one of the designers of the Liberty engine, and the engineering staff of the Franklin Automobile Company, under the direction of the defendants' expert Stellman, its Chief Engineer. Limited success may here and there have been attained, but the problem in its full sweep was not solved until the Gulick concept, carried forward to some extent by Maynard, with possibly some instruction from Jardine, reached commercial embodiment. Then and then only did the industry by acceptance of the Aluminum Company's piston answering the Maynard drawing and specification, recognize the complete solution of the problem, and the many millions that have since been sold and used have set the seal of commercial approval upon such solution. It is idle to say in an imperfect world that invention should be denied because no piston, not even Maynard, performs perfectly.

It is, of course, axiomatic that commercial success is not of itself conclusive upon the question of novelty or invention, and where such success is fairly attributable to other causes, such as the reputation of the manufacturer, his extensive advertising and superior salesmanship, it will be wanting in persuasiveness. But where no alternative inferences are to be drawn, commercial success is highly indicative of invention. This is so in the usual case where the test of success is acceptance by the public. But it must be here noted if not elsewhere observed, that where success follows acceptance by experts rather than by those unskilled, it is of far greater tribute to the ingenuity of the inventor. It is clearly demonstrated upon this record, if indeed it is not within the field of general knowledge, that the automotive industry in acceptance of new devices upon which success of highly complicated and delicate machinery in the hands of inexpert users must depend, exercises the greatest caution, and things new, whatever their theoretical virtue, will not be considered until they have been subjected to the most rigorous practical tests for efficiency and durabil-

ity. This must be so when failure of one year's product may bring tremendous losses or complete disaster.

So also with respect to the presumption that attaches to the validity of a grant by the Patent Office. Where, as in this case, substantially all pertinent prior art has been cited against the patent, where in hard fought interferences novelty and invention have been challenged, and where priority of conception has been finally adjudicated only upon repeated review in both administrative and judicial forums, the patent should not be stricken down except upon very clear and convincing proof of invalidity. The weight to be given this presumption has been so recently and so thoroughly discussed, and the rule stated in all the varying formulae by which courts have announced and affirmed it, in *Radio Corporation* v. *Radio Laboratories,* 293 U. S. 1, that it is unnecessary here to repeat or to cite additional cases.

In what we have said thus far it is perhaps clear that in respect to novelty and invention over recorded prior art we have concluded the Gulick patent to be valid. But this is not the whole controversy with respect to it. It is the contention of the defendant that the Gulick patent is invalid because abandoned by him prior to his application, and because it had been in public use in this country for more than two years before such application within the purview of R. S. §§ 4886, 4920. The Master so held. His findings were based on the fact that Gulick's 1911 and 1914 pistons had been scrapped, and on inference that Gulick's expressed satisfaction with his 1914 experimentation was conclusive of the completion of his invention in that year. That there had been no formal abandonment or disclaimer is clear. The Master's findings are based upon constructive abandonment deduced from the above circumstances and delay in applying for a patent.

Questions relevant to actual or to constructive abandonment of inventions are questions of fact, *Walker, 6th Ed.,* § 152; *Kendall* v. *Winsor,* 21 How. 330, and much weight must therefore be given to the findings of the Master, who saw and heard the witnesses. Consideration should also be given to the rule that concurrent findings of Master and Judge should not be set aside except for clear error, although this may prove to be an unsafe guide to just decision where exceptions to a master's report are unilluminated by oral argument and a decree entered without elucidation of the reasons upon which it is based. The law, however, in reference to abandonment, requires that every reasonable doubt relevant to any such question should be resolved in favor of the patent, for it does not

favor forfeiture. *Walker*, § 152 and cases there cited. It was said by this court, *Gear Grinding Machine Co.* v. *Studebaker Corp.*, 270 Fed. 934, 936: "Abandonment depends upon intent, actual or imputed. The actual intent did not exist, and the circumstances do not require that the intent be by law imputed as against the truth." That Gulick did not intend to abandon the subject matter of his invention seems to us clear. From the beginning of his experimentation in 1911 he made drawings from time to time, tests with slotted iron pistons and later with slotted aluminum pistons, and was at the same time not only busy in the earning of a livelihood but with plans for the purchase from a receiver of the property of the Amplex Motor Car Company. The scrapping of his experimental pistons was without his knowledge or consent, and the fact that he replaced the experimental pistons of the Renault car with standard pistons before its sale negatives any inference that the experimental pistons were intended to be abandoned. Distinction must also be made between abandonment of the subject matter of a patent and abandonment of crude experimental devices. While Gulick variously expressed satisfaction with the performance of his experimental pistons, it is clear upon review of his entire evidence that what he had then in mind was that they performed satisfactorily in reference to clearance. They had not demonstrated their strength and durability, or that they were properly designed or machined for commercial use.

The Master was largely influenced by the fact that Gulick's clarification of his testimony followed a recess, and gave little credence to it. We have reviewed it carefully. That Gulick's experiments were not completed to the end that a practical piston had been fully designed and tested seems clear. He is in some respects corroborated and in no wise impeached. Mere suspicion as to his good faith is not such clear and convincing proof of abandonment as will satisfy every reasonable doubt and sustain the heavy burden which rests upon those challenging the validity of his patent. The Master did not apply to the evidence on the issue of abandonment that standard of proof required to establish it and so the question is one of law, and the finding must be rejected.

There was no public use of the Gulick invention more than two years prior to the application so as to invalidate the patent. So long as use by the inventor can fairly be considered experimental and collateral to the development of the invention in its complete form, the bar of the statute does not begin to run. *Reo Motor Car Co.* v. *Gear Grinding Co.*, 42 Fed. (2d) 965 (C. C. A. 6). The

emphasis that is laid upon Gulick's use of a car with experimental pistons for business and pleasure for a considerable period does not impress us. Road tests of many thousands of miles are considered necessary to determine the efficiency of an engine and its parts. That such transportation is not wasted does not of itself constitute a public use. As was said in the second *Gear Grinding* case: "We see no principle in the precedents or in the policy of the statute which would require a valuable invention to be lost by permitting the bar to begin to run while the invention . . . is being gradually improved and developed up to the point of ascertaining whether it has real utility. Nor can it rightly be said that a public use of a developing and incomplete invention—incomplete as finally claimed—can nevertheless operate as a public use bar because adding the final element of perfection did not involve invention as compared with the earlier form to which it was added."

We are not convinced that the Gulick application was broadened to include new matter after intervening rights had arisen. This issue was adjudicated in the Court of Appeals of the District of Columbia, 17 Fed. (2d) 365, and the Court of Customs and Patent Appeals, 47 Fed. (2d) 366, 367. With the conclusions there reached we agree. As to the Monckmeir and Schoengarth prior uses, it is sufficient to say without analysis of the voluminous evidence, that they rest mainly upon the uncertain memory of witnesses testifying long after the event, and this does not rise to the dignity of proof requisite to establish prior use. *Barbed Wire Patent Case,* 143 U. S. 275; *Eibel Process Case,* 261 U. S. 45.

Jardine, upon an application filed March 11, 1920, claimed an invention of which the chief object was construction of a light alloy piston which would operate satisfactorily at all temperatures and lend itself to economic methods of manufacture. He cut away all the skirt portions at the webs, extending the latter to nearly the length of the skirt parts or slippers. Horizontal slots partially insulated the slippers from the head and these were split vertically to render them yieldable to contact with the cylinder wall. The head was integrally connected to the skirt only in the region above the bosses. His thought was that since heat expansion tends to increase the diameter of the piston in a direction parallel with the wrist pin bosses, when the skirt around the bosses is removed, the central part of the web is free to move while its ends are restrained and resisted by the skirt faces in contact with the cylinder wall. There is insistent challenge and as insistent defense of the validity

of Jardine. On the one hand it is urged that Jardine is but the slipper structure of Ricardo patent No. 1,294,833, and that it involved no invention to merely slit vertically its skirt parts as disclosed by Gulick and others. The response is that Jardine discloses a combination of inter-related operating parts that goes far beyond Ricardo, is economical to construct and carries the Gulick concept an important step forward. Jardine indicates the forces, thermal and mechanical, which bear upon the flexible web to compensate for heat expansion of the cylinder head, pointing to the web as being in effect a cantilever structure, weakest at its supports. Jardine came to the attention of the Aluminum Company and the Maxwell at a time when Ricardo and other English engineers were trying to modify the Ricardo piston to meet the piston problem. It was thought to give great promise. Tests had been made and commercial manufacture planned when the Maynard piston was presented to them. It appeared so much better that the construction illustrated and described by him was adopted. Since it is the Maynard specific form embodying the basic concept of Gulick that made commercial piston history, since Jardine was without substantial commercial recognition and none of the accused devices are slipper pistons, since whatever Jardine contributed to the art, if anything, is said to be incorporated in Maynard and since the really important infringement is said to be the copying by the defendants of the commercial embodiment of Maynard, we feel under no necessity at this time of ruling upon the validity of the Jardine patent or the fact of its infringement.

Maynard upon a patent application filed January 3, 1931, embodies the Gulick combination of skirt insulation, skirt flexibility by means of vertical slotting cooperating with longitudinal slotting, and flexible webs in the region of the wrist pin bosses. He also follows Jardine's simplified design to permit economical manufacture and Jardine's boss relief. The Maynard piston, however, is not a slipper piston. While Jardine carried the webs nearly to the bottom of the skirt and omitted all of the skirt on the web faces, Maynard provided webs about two-thirds of the length of the skirt and continued the latter circumferentially below the webs except for a single vertical slot throughout one bearing face of the skirt. This structure increased the effect of heat on retarding the expansion of the piston so as to permit of a narrowed web. The upper part of the skirt, which reaches higher temperature, is provided with greater compensation against heat expansion by having its pe-

riphery interrupted by relief about the bosses. The lower part of the skirt requires no interruption of its periphery other than the vertical slot because it receives less heat. This results in a better bearing surface and means additional to the piston rings for closing the passage between the piston and the cylinder wall. It is clear that Maynard, while not departing from the teaching of Gulick in basic combination of elements, discloses a piston lighter and more economical of manufacture than Gulick and one more rugged and durable than Jardine. That the Maynard piston had a very great effect upon the industry and substantially advanced the art, there can be no doubt upon this record. In the precise form disclosed by Maynard and depicted in his drawings, many thousands were made and successfully used. In a somewhat modified form its production and use has run into very many millions.

Little is claimed for Mooers and Schmiedeknecht, and while some of the claims for each may possibly read on some of the accused structures, they have apparently no commercial history and have not substantially advanced the art. We do not pass upon them, and apprehend that the real controversy here is in respect to validity and infringement of Gulick and Maynard.

Of the devices charged to infringe, the one of prime importance to the plaintiff is undoubtedly the Sterling piston, exemplified by Exhibit 1. The defendants seek to avoid infringement by this structure, which with slight modification, follows the drawings and description of the Maynard patent, and without change, the commercial structure of the plaintiff's licensee, by the contention that its webs are rigid at the top and thus it is distinguished from Maynard, compensation for rigidity being achieved by reducing the thrust faces of the piston skirt at an angle to the verticle sides of the web, giving to the relief in the region of the bosses the so-called "keystone" configuration. But there are no limitations in the claims in suit as to the region of flexibility in the webs, and if the keystone relief provides greater flexibility at the union of the webs with the skirt, it is but a difference in degree, and not one of mode of operation or result and will not avoid infringement. In comparing commercial embodiments of invention with the drawings of patents it is not unusual to find that without departing from the teachings of the inventor improved operation may result from some modification of the disclosure. This court has indicated, *Gordon Form Lathe Co.* v. *Walcott Machine Co.*, 32 Fed. (2d) 55, 61, that superiority of operation, even when brought about by a valuable im-

provement which perhaps was patentable as such, will not of necessity negative infringement, citing *Schiedel Toy, etc., Co.* v. *Clark*, 217 Fed. 760, 771, *Toledo Machine & Tool Co.* v. *E. W. Bliss Co.*, 287 Fed. 443, 447. The Gordon and Melling patent there considered was in a true sense a pioneer patent and entitled to broad equivalents, but this does not mean that meritorious inventions which substantially advance the art are entitled to no reasonable range of equivalency. As was said in *Eibel Process* case, supra, at 63: "Eibel made a very useful discovery which has substantially advanced the art. His was not a pioneer patent creating a new art; but a patent which is only an improvement on an old machine may be very meritorious and entitled to liberal treatment. Indeed, when one notes the crude working of machines of famous pioneer inventions and discoveries, and compares them with the modern machines and processes exemplifying the principle of the pioneer discovery, one hesitates in the division of credit between the original inventor and the improver; and certainly finds no reason to withhold from the really meritorious improver, the application of the rule '*Ut res magis valeat quam pereat*' which has been sustained in so many cases in this court." A careful consideration of the patents to Gulick and Maynard, an analysis of the claims of each in suit, and a review of the evidence as to principles and modes of operation, lead us inevitably to the conclusion that the Sterling piston (Exhibit 1) infringes the claims in suit of both, and that such minor differences as appear in the commercial embodiment of Maynard, with which Exhibit 1 is identical, do not fall without the reasonable range of equivalents to which the inventors' contribution to the advancement of the art entitle them.

In the remaining accused devices we find no infringement. True, there is similarity. Here and there are identical elements, singly and in combination, but the complete combination upon the conception of which we found Gulick and Maynard to denote invention, does not in any others appear, and so it must be said here as in *Gear Grinding Machine Co.* v. *Studebaker Corporation*, supra, in reference to such situation: "It is the patentee's necessary dependence upon the co-operation of all the elements in one machine in order to make the claims valid that also makes this achievement possible."

We find claims 1, 11, 12, 13, 15, 18, 30, 33 of Gulick and Maynard patents in respect to all of the claims sued upon valid. We find such claims to be infringed by the Sterling piston exemplified by Exhibit 1. The decrees below are set aside and the causes remanded for the entry of

decrees granting the usual relief of injunction and accounting in respect to such infringement as has been found and dismissing the bills with respect to the alleged infringements of Jardine, Mooers and Schmiedeknecht, without prejudice. Costs of appeal will be borne by the defendants.

Syllabus.

# SCHRIBER-SCHROTH CO *v.* CLEVELAND TRUST CO. ET AL.*

CERTIORARI TO THE CIRCUIT COURT OF APPEALS FOR THE SIXTH CIRCUIT.

No. 3. Argued October 18, 19, 1938.—Decided November 7, 1938.

1. Where it is improbable, notwithstanding the doubtful validity of a patent, that conflict of decision respecting its validity will arise in different circuits, because of the concentration in one circuit of the industry in which the patented devices are used, there is reason for granting certiorari to review a decision in that circuit sustaining it. P. 50.

2. A patent does not extend beyond the invention described and explained as the statute requires; it can not be enlarged by claims in the patent not supported by the description. P. 57.

3. The application for a patent cannot be broadened by amendment so as to embrace an invention not described in the application as filed, at least when adverse rights have intervened. *Powers-Kennedy Co.* v. *Concrete Co.*, 282 U. S. 175; *Permutit Co.* v. *Graver Corporation*, 284 U. S. 52. *Id.*

4. Amendments to Patent No. 1,815,733, to Gulick, for a combination in the structure of pistons of internal combustion engines for automobiles, designed to prevent undue thermal expansion of the pistons when in operation, were unlawfully added. P. 51.

5. In this combination, the head and skirt of the piston, separated by an air space, are connected and held in proper relation to each other by two webs which extend longitudinally within the skirt and which, pierced at right angles for wrist-pin bearings, support the piston pin bosses. The skirt is longitudinally split in order to minimize the effects of thermal expansion. The Circuit Court of Appeals regarded lateral flexibility of the webs as an essential element of the invention. The original application, however, contained no reference in terms to laterally flexible webs or to the function of the webs in securing flexibility of the skirt, but described the webs as "extremely rigid" and stated that an object of the invention was "to rigidly support the piston pin bosses from

*Together with No. 4, *Aberdeen Motor Supply Co.* v. *Cleveland Trust Co. et al.*, and No. 5, *F. H. Rowe Sales Co.* v. *Cleveland Trust Co. et al.*, also on writs of certiorari to the Circuit Court of Appeals for the Sixth Circuit.

the piston walls," and that the arrangement provided "a particularly strong support for the bosses." The webs, as shown by the drawings, conformed to these specifications, and neither drawings nor specifications gave dimensions showing thickness or other proportions of the webs which might suggest a flexible structure.

*Held:*

(1) That, after a similar piston with the element of flexible webs had come into commercial use and another had been described in an appliaction for patent, the patentee could not add that element to his application by amendment. P. 55.

(2) Amendments to that end could not be supported as being but clarifications of the application as filed. P. 57.

The contention that lateral flexibility was implied in the original description as an inherent property of the metal composing the web, and was disclosed by the drawings, is rejected.

Inherent flexibility of the web in coöperation with the slit skirt can not be depended upon to produce the desired effect in rendering the skirt yieldable in response to cylinder wall pressure. That depends upon design of the web, with correct proportioning of the different parts as to location and thickness to produce lateral flexibility. Inherent rigidity, made more effective by design of the webs, would correspondingly curtail the desired effect.

6. Decisions of the Court of Appeals for the District of Columbia and the Court of Customs and Patent Appeals sustaining the Gulick amendments are accorded weight but are not controlling in this Court when the validity of the amendments is involved in an infringement case. P. 59.

7. As flexible webs are neither described in the specifications nor mentioned in the claims of the patent for a like combination to Maynard, No. 1,655,968, they can be imported into them only by reference to the drawings or by inference from the inherent flexibility of the structure, which, as in the case of Gulick, are insufficient to accomplish the result. P. 60.

92 F. 2d 330, reversed.

CERTIORARI, 304 U. S. 587, to review the reversal of a decree holding certain patent claims invalid in suits for infringement. Other patents, held invalid by the District Court, but not passed upon by the court below, were not involved in this review.

*Messrs. Thomas G. Haight* and *John H. Bruninga*, with whom *Mr. John H. Sutherland* was on the brief, for petitioners.

*Messrs. Arthur C. Denison* and *F. O. Richey*, with whom *Mr. Wm. C. McCoy* was on the brief, for respondents.

MR. JUSTICE STONE delivered the opinion of the Court.*

The principal question for decision is whether the court below rightly sustained the validity of two patents by including in the combination constituting the alleged invention of each an element which was not in terms described in one, and the description of which in the other was added only by amendment to the application after it was filed.

Respondent, the Cleveland Trust Company, is the assignee in trust of some eighty patents relating to pistons of the type employed in internal combustion engines for automobiles, under a pooling agreement to which an automobile manufacturer and a number of manufacturers of pistons are parties. It brought the present suits in the District Court for Northern Ohio to enjoin infringement of five of the assigned patents. The case was tried before a special master who, upon the basis of elaborate findings, held that the Gulick patent, No. 1,815,733, applied for November 30, 1917 and allowed July 31, 1931, was invalid for want of invention and because of the addition to the application by amendment in 1922 of a new element of the alleged invention. In reaching this conclusion he relied on this Court's decisions in *Powers-Kennedy Corp.* v. *Concrete Co.*, 282

*Opinion reported as amended by Order of December 12, 1938, *post*, p. 573.

U. S. 175 and *Permutit Co.* v. *Graver Corporation*, 284 U. S. 52, as inconsistent with the result of interference proceedings in which Gulick's amendments were sustained, *Long* v. *Gulick*, 17 F. 2d 686, *Hartog* v. *Long*, 47 F. 2d 369. The master also held that the Maynard patent No. 1,655,968, applied for January 3, 1921 and allowed January 10, 1928, was invalid for want of invention and for failure to describe and claim the alleged invention. He held invalid upon various grounds the other patents, which are not presently involved.

The District Court adopted the findings and conclusions of the master and gave its decree for petitioners. The Court of Appeals for the Sixth Circuit reversed, as to the Gulick and Maynard patents only, holding that they were valid and infringed. 92 F. 2d 330.[1] As the court regarded the claims which it sustained as basic and thought that a full recovery could be had by respondent under them, it did not pass upon the validity of the other patents or decide other questions involved in the appeal.

Petition for certiorari raising the question, among others, whether the Court of Appeals had erred in holding patentable a combination including one element not described in the original application for the Gulick patent and later added to it by amendment, and not described at all in the Maynard patent, was at first denied, there being no conflict of decision. 303 U. S. 639. We later granted certiorari, 304 U. S. 587, on a petition for rehearing showing that, notwithstanding the doubtful validity of the patents, litigation elsewhere with a resulting conflict of decision was improbable because of the concentration of the automobile industry in the sixth circuit. Cf. *Paramount Publix Corp.* v. *American Tri-Ergon Corp.*, 294 U. S. 464; *Altoona Publix Theatres* v. *American Tri-Ergon Corp.*, 294 U. S. 477.

[1] The decree sustained Gulick's claims numbered 1, 11, 12, 13, 15, 18, 30 and 33, and Maynard's claims numbered 1, 6 and 8.

It is important for the proper functioning of the piston in a gas engine that it should fit the explosion chamber closely so as to conserve power, prevent the passage of lubricating oil around the piston into the chamber, and insure the smooth and noiseless movement of the piston within the cylinder. In designing gas engines for automobiles and other purposes requiring a high speed piston reciprocation with the accompanying development of high temperature in the explosion chamber, it is desirable to avoid thermal expension of the close fitting piston, which will result in loss of power and possible injury to the mechanism through increased friction, which may cause the piston to seize or stick. The danger of undue expansion is increased when, as is advantageous in automobile engines, the piston is of aluminum, which has a higher coefficient of expansion than the iron or steel chamber within which the piston moves.

Both the Gulick and Maynard patents are for combinations in the structure of a piston for gas engines designed to prevent or restrict undue expansion of the piston when in operation. The Gulick patent exhibits a piston in which the ring-carrying head is separated by an air space at is periphery from the cylindrically shaped skirt or guide wall, whose surface engages the inner surface of the cylinder. The piston head and skirt are connected by two "webs" or walls extending longitudinally through the interior of the skirt. The webs are pierced at right angles for wrist pin bearings, and support, at the bearings, piston pin bosses formed with integral flanges extending laterally from their respective bosses to form the webs, which in turn are integrally connected on either side with the interior wall of the lower part of the skirt and at their ends with the piston head. The skirt is longitudinally split on one side at a point in its circumference approximately midway between the pin bosses, with the edges of the skirt formed by the split separated so as

to admit of the free movement of the edges toward each other.

The structure is thus designed to minimize the expansion resulting from high temperatures developed in the chamber and to avoid the effects of thermal expansion of the skirt. The webs, which afford at the wrist pin bearings the means for connecting the piston-rod with the piston, serve to hold the head and skirt in proper relation to each other so that the air space between them retards flow of heat from the head to the skirt, undue expansion of the skirt, and the consequent increase of friction between piston and enveloping cylinder. Undue expansion of the piston is said by the patent's specifications to be avoided by the separation of the skirt by the longitudinal split in order to admit of unrestrained movement of the edges of the skirt toward each other. Elsewhere they state that "when the longitudinal split is used, as shown, the web structure has sufficient lateral flexibility to permit the split to close more or less under the action of the expansion forces incident to the heating of the piston."

The elements of the combination as enumerated in Claim 39 are: "A piston for an engine cylinder comprising a skirt, a head separated from the skirt wall around its entire periphery, said skirt being longitudinally split to render the skirt wall yieldable on every diameter in response to cylinder wall pressure, wrist pin bosses, and means rigidly connecting said bosses to the head and yieldingly connecting said bosses to the skirt whereby said skirt is yieldable in response to cylinder wall pressure." Reference to a combination including with other elements, web connections, "whereby said piston skirt is rendered yieldable during operation in response to cylinder wall pressure," appears in Claim 18.

The combination of piston head separated from a slitted skirt by an air space, the two being connected by

webs supporting wrist pin bearings with bosses which do not come directly in contact with the walls of the skirt, was plainly foreshadowed by the prior art as a practicable means of minimizing the flow of heat from head to skirt and of securing lateral flexibility in the skirt. The expired Spillman and Mooers patent No. 1,092,870, of April 14, 1914, pooled with the patents in suit, showed a piston with head separated by an air space from the skirt, the two being connected by a web separated from the skirt except at the point of integral connection with it at the lower end of the piston, and providing bearings for a wrist pin connection with bosses not in direct contact with the wall of the skirt.

Flexibility of the skirt attained by longitudinal slits was old, as shown by the Ebbs patent No. 700,309 of 1902, and Van Bever, No. 1,031,212 of 1912. The Franquist piston, patent No. 1,153,902 of 1915, another of the pooled patents, which showed piston head partially separated from skirt by air spaces, attained flexibility of the piston wall by longitudinal grooves in the skirt which interrupted its outer periphery though connected at the inner edges of the groove by a fold of the metal on the accordion principle. The Long piston, patent No. 1,872,772 of 1932, which the master and the district court found was in commercial use from 1917 on, and before the amendment of the Gulick application, presently to be discussed, showed longitudinal slits cut through the skirt, which was separated by air spaces from the piston head, the two being connected by parallel webs pierced for wrist pin bearings.

The court below found invention in the Gulick disclosure in a combination of elements, of which one was webs "laterally flexible," which were not specifically so described in the Gulick application until the amendment of 1922. Conceding that the deceleration of the flow of heat from head to skirt by an air gap might be an obvious

expedient of the art, and that to slit the skirt vertically so as to compensate for thermal expansion might not be beyond the skill of the art, the court added: "But to combine insulation of head from skirt, retraction of the bosses from the skirt periphery, connection of such bosses to the skirt with webs laterally flexible and yet so carried from the head as to support the load upon the wrist pin with sufficient strength and rigidity, and to utilize the mechanical force of the cylinder wall upon the skirt and the thermal expansion of the bosses so as to compensate evenly and fully for head expansion and to secure a balanced flexibility of the skirt with no bending concentration at any point therein, discloses, we think, a meritorious concept beyond the reach of those skilled in the art." 92 F. 2d, at 334.

We can find no support in the opinion for the contention of respondent that the Circuit Court of Appeals did not consider the flexible web an essential element in Gulick's invention. Its enumeration, among other named elements, of the connection of head and skirt by webs laterally flexible as embodying a meritorious concept must be taken to indicate that the court regarded the flexible webs as a part of the invention, the more so since it indicates that lateral flexibility of the webs is the only feature mentioned not within the prior art or within the expected skill of the art. It rejected, on the authority of *Long* v. *Gulick, supra,* and *Hartog* v. *Long, supra,* the contention made below and pressed here that Gulick's application as filed did not disclose "webs laterally flexible" and the resultant "balanced flexibility of the skirt," and that those features were added to specifications and claims after the use of the Long piston and after they had appeared in Hartog.

The Gulick application, which was filed November 30, 1917, contained no reference in terms to laterally flexible webs or to the function of the webs in securing flexibility

of the skirt. The specifications pointed to no inadequacy in the structure or function of webs of the prior art which would be remedied by the webs specified and to no function to be performed by them other than as a means of connecting and holding head and skirt so as to maintain the air gap between them and to support the wrist pin bearings and their bosses as both were shown in Spillman and Mooers. On the contrary, Gulick's application described the webs as "extremely rigid" and stated that an object of the invention was "to rigidly support the piston pin bosses of a piston from the piston walls." The only description of the web structure was as follows:

"It will be seen that in addition to providing a piston with a split skirt the above described construction also provides an extremely rigid connection between the piston pin bosses and the skirt of the piston, which construction may be used either with or without the split skirt and separated head. The arrangement of the supporting flanges 17 between the ends of the piston pin bosses and the connection of those flanges with the piston skirt provide a particularly strong support for the bosses."

The webs as shown by the drawings conform to the specifications of an "extremely rigid connection" between piston pin bosses and skirt and "a particularly strong support for the bosses." They form chords subtending the arc of the circle of the skirt, with flanges depending from the head to the bosses at right angles to the webs, and the skirt as shown is provided with interior corrugations and with an inturned flange at the bottom, all familiar devices for securing rigidity of structure. Neither drawings nor specifications give dimensions showing thickness or other proportions which might suggest a flexible structure.

In 1922, after the Long piston, whose webs concededly were laterally flexible, was in commercial use, and Hartog, to the knowledge of Gulick's assignee, had specified and

claimed a yieldable web, Gulick copied the Hartog claim and amended his specification so as to state that one of the objects of his invention was "to rigidly support the piston pin bosses of a piston from the piston wall against mechanical load thrust from the connecting rod without interfering with the yielding characteristics of the skirt in response to cylinder wall pressure." And he amended his description of the web structure to read:

"The arrangement of the supporting flanges 17 between the ends of the piston pin bosses and the connections of those flanges with both the piston guide portion and the head provide a particularly strong construction, and at the same time, when the longitudinal split is used, as shown, the web structure has sufficient lateral flexibility to permit the split to close more or less under the action of the expansion forces incident to the heating of the piston."

Petitioners insist that the flexible web element of the Gulick combination, as found and sustained by the court below, is excluded from the Gulick patent by reason of his failure to describe that element in his application as filed, and that he could not cure the omission and secure a patent embodying that feature by substituting by way of amendment "webs laterally flexible" for "extremely rigid webs" in the description of his invention. The statute, R. S. § 4888, provides that the application which the inventor must file as a prerequisite to a patent shall contain "a written description of [his invention] . . . and of the manner and process of making, constructing . . . and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art . . . to . . . construct . . . and use the same; and in case of a machine, he shall explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions; . . ."

The object of the statute is to require the patentee to describe his invention so that others may construct and use it after the expiration of the patent and "to inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not." *Permutit Co.* v. *Graver Corporation,* 284 U. S. 52, 60. It follows that the patent monopoly does not extend beyond the invention described and explained as the statute requires, *Permutit Co.* v. *Graver Corporation, supra,* at 57; that it cannot be enlarged by claims in the patent not supported by the decription, *Snow* v. *Lake Shore & M. S. Ry. Co.,* 121 U. S. 617; cf. *Smith* v. *Snow,* 294 U. S. 1; and that the application for a patent cannot be broadened by amendment so as to embrace an invention not described in the application as filed, at least when adverse rights of the public have intervened. *Railway Co.* v. *Sayles,* 97 U. S. 554, 563, 564; *Powers-Kennedy Corp.* v. *Concrete Co.,* 282 U. S. 175, 185-186; cf. *Webster Electric Co.* v. *Splitdorf Electrical Co.,* 264 U. S. 463; *Permutit Co.* v. *Graver Corporation, supra; Crown Cork & Seal Co.* v. *Gutmann Co.,* 304 U. S. 159.

Respondent earnestly argues, as both courts held in the interference proceedings, *Long* v. *Gulick, supra,* and *Hartog* v. *Long, supra* that the changes in Gulick's application were not alterations in the description of his invention but were at most a permissible clarification of its description of the flexible web element which was present, or at least plainly suggested, in the specifications and drawings of the Gulick application. Flexibility, it is said, as is well known to those skilled in the art, is an inherent property of the metal out of which the webs are made, and in consequence reference to the webs in the application as filed was sufficient to import into it as a part of the description of the invention their known quality of

flexibility, a description which was made more specific, but not altered, by the amendments. The argument suggests that it was but the skill of the art, and not invention, to substitute a flexible for a rigid means of connecting head and skirt in a known combination of piston head separated from a slitted skirt by an air space and connected by webs. But in any case we think it falls short of establishing that the Gulick amendments were not new matter beyond the scope of the device described in the application as filed.

The properties of any given material are many and diverse. The antithetical qualities of rigidity and flexibility of a structure are not absolute but relative; it may be more rigid than some and more flexible than others; too rigid for some purposes and too flexible for others. The one quality may be increased and the other diminished by choice of materials from which the structure is made and by variation in its proportions. If invention depends on emphasis of one quality over the other, as the court below found was the case with the laterally flexible webs in the Gulick device, the statute requires that emphasis to be revealed to the members of the public, who are entitled to know what invention is claimed. That is not accomplished either by naming a member having inherent antithetical properties or by ascribing to it one property when the other is meant. Since rigidity is a relative term, the characterization of the structure as rigid must be taken as emphasizing rigidity rather than its opposite, flexibility, with special reference to the conditions to be encountered in the operation of the piston. Even if those skilled in the art would have known that a piston with webs which would yield enough laterally to accommodate the constriction of the split skirt under the pressure developed by thermal expansion would work most effectively if the webs were laterally flexible rather than

rigid, that was not the invention which Gulick described by his references to an extremely rigid web.

Gulick also failed to explain the principle of his machine so as to distinguish it from the prior art. Webs having the inherent properties both of rigidity and flexibility were familiar elements in piston structure. The court below, after pointing out that the slots of the Franquist skirt rendered it capable of limited constriction, found a distinguishing feature of Gulick's piston to be a web relatively flexible laterally, so as to accommodate the constriction of skirt to thermal expansion, the combination operating to secure a "balanced flexibility" of the skirt. But that principle—facilitating skirt constriction rather than obstructing it—was first explained and its embodiment in the flexible-webbed device was first claimed by the amendments to the application.

As already indicated, the omission from the specifications was not supplied by the drawings, which failed to disclose by dimensions the proportions of the webs. Inherent flexibility of the web in coöperation with the slit skirt cannot be depended upon to produce the desired effect in rendering the skirt yieldable in response to cylinder wall pressure. As respondent's own expert testified, that depends upon design of the web, with correct proportioning of the different parts as to location and thickness to produce lateral flexibility. Inherent rigidity, made more effective by design of the webs, would correspondingly curtail the desired effect.

We recognize the weight to be attached to the determinations in the interference proceedings in which the Court of Appeals of the District of Columbia and the Court of Customs and Patent Appeals sustained the Gulick amendments. Cf. *Radio Corporation* v. *Radio Laboratories*, 293 U. S. 1, 7. But the decisions in those cases are not controlling here. So far as the courts relied on

the inherent flexibility of the webs to supply the feature of lateral flexibility omitted from the Gulick description they ignored the principle recognized in *Permutit Co.* v. *Graver Corporation, supra,* and *Powers-Kennedy Corp.* v. *Concrete Co., supra.* So far as they relied on the drawings to supply the omission they disregarded the fact shown both by inspection and by the evidence presented here that the drawings do no more to point to Gulick's invention than does the fact of inherent flexibility. We conclude that respondent can take no benefit from the flexible web element added by amendment to the Gulick application.

In sustaining the claims of the Maynard patent the court below said that "Maynard . . . embodies the Gulick combination of skirt insulation, skirt flexibility by means of vertical slotting cooperating with longitudinal slotting, and flexible webs in the region of the wrist pin bosses. He also follows Jardine's simplified design to permit economical manufacture and Jardine's boss relief," and after enumerating certain mechanical features of the Maynard construction differing from Gulick and Jardine, concluded: "It is clear that Maynard, while not departing from the teaching of Gulick in basic combination of elements, discloses a piston lighter and more economical of manufacture than Gulick and one more rugged and durable than Jardine." 92 F. 2d, at 337.

Invention over Gulick and Jardine was apparently found in the details of construction but, as we are without other indication of the character of the invention, we construe the court's opinion as including the laterally flexible webs as an essential element in the patented combination. As flexible webs are neither described in Maynard's specifications nor mentioned in his claims, they can be imported into them only by reference to the drawings or by inference from the inherent flexibility of the structure, which, for reasons already given in our considera-

tion of the Gulick amendments, are insufficient to accomplish that result. We conclude that the court below erred in giving any effect to so much of the Gulick patent as by amendment describes or claims the flexible webs, and in treating any of the specifications or claims in Gulick and Maynard as referring to such webs. We assume that it sustained Claim 1 of the Gulick patent, which makes no mention of web flexibility, only by reading into it that element, which the court regarded as an essential part of the invention.

As the Court of Appeals did not pass upon other questions in the case, the causes will be reversed and remanded to it for further proceedings, in conformity with this opinion, with respect to such claims of the patents in suit as appellant below submitted to that court for adjudication.

*Reversed.*

MR. JUSTICE ROBERTS took no part in the consideration or decision of this case.

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**SECOND DECISION OF THE COURT OF APPEALS,**
**108 FED. (2D) 109.**

**Nos. 7223-24-25, 8094-95-96**

UNITED STATES CIRCUIT COURT OF APPEALS

SIXTH CIRCUIT

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THE CLEVELAND TRUST COMPANY, CHRYSLER CORPORATION, *Appellants,*

No. 7223 v.

THE SCHRIBER-SCHROTH COMPANY, *Appellee.*

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THE SCHRIBER-SCHROTH COMPANY, *Appellant,*

No. 8094 v.

THE CLEVELAND TRUST COMPANY, CHRYSLER CORPORATION, *Appellees.*

APPEALS from the District Court of the United States for the Northern District of Ohio, Eastern Division.

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Decided October 6, 1939.

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Before HICKS, SIMONS and ALLEN, Circuit Judges.

SIMONS, Circuit Judge. Our former opinion in this much litigated patent controversy involving automobile pistons is reported at 92 Fed. (2d) 330, under identical style, but including disposition of the companion cases brought by appellants against the Aberdeen Motor Supply Company, No. 7024, and the F. E. Rowe Sales Company, No. 7025. The Supreme Court, after denying certiorari and a petition for rehearing, received the cases upon a second rehearing petition and reversed with remand to us for consideration of questions presented and not determined, *Schriber-Schroth Co.* v. *Cleveland Trust*

*Co.*, 305 U. S. 47; directions amended, 305 U. S. 573.[1] A second group of appeals (8094, 8095, 8096) from decrees against appellees in the first case, responsive to our decision therein, is now consolidated for consideration with the reconsideration required by the order of remand.

The claims of five patents, and a number of infringing devices, were in the first instance presented for adjudication. In their consideration we were greatly impressed by the story disclosed by the record of the long search and sustained effort on the part of exceptionally competent automotive engineers to completely solve the problem of a successful aluminum piston operating freely with minute clearances in an iron cylinder. There had been advances, "foreshadowing," perhaps, that solution would not always defy inventive genius, though on the whole the aluminum piston as heretofore noted had received a "black eye" in the industry. Much had been expected of a piston invented by one Jardine, and it was about to be put into commercial production when a design disclosed by Maynard, which seemed an improvement thereon, was produced by the appellants' licensee, was accepted by major companies in the industry, and went into use to the number of many millions. In analyzing the Maynard invention it appeared to us that however meritorious certain structural improvements might be, it nevertheless embodied the basic concept of the patent to Gulick owned by the appellant and in suit. We held certain claims of Gulick and Maynard to be valid and infringed without passing upon the intermediate disclosure of Jardine, though recognizing that Jardine may have made substantial contribution to the art.

Observing that many if not all of the elements of the Gulick combination were old, we held his precise combination to be novel and to have the quality of invention, and that its reproduction by the appellees in the specific form disclosed by Maynard was infringement of both. In a recital of the Gulick achievement in terms of elements, function and result, we assigned to the webs of Gulick the rigidity proclaimed by his specification in the dimension in which they furnished "a particularly strong support for the bosses," but a lateral flexibility in the dimension wherein rigidity appears not to have been required, where it would not serve the purpose an-

[1] The Supreme Court granted certiorari after twice denying it on the ground that conflict was improbable because of the concentration of the automobile industry in the Sixth Circuit. It might be interesting to explore the availability of the Declaratory Judgment Act to dealers in other circuits to raise conflict.

nounced, and where it would appear to interpose an obstacle to the expected functioning of a split skirt. There was assumption that since the specification was addressed to those skilled in the art, a purpose to provide a particularly strong support for the bosses was fully served by vertical rigidity, and made implicit in the original specification a lack of rigidity otherwise. With this view we found no difficulty in agreeing with the tribunals that sustained the Gulick amendment reciting lateral flexibility as mere clarification.

The Supreme Court, concluding that Gulick's failure to describe the flexible web element as a feature of his invention, and his failure in this respect to explain the principle of his machine so as to distinguish it from prior art, did not conform to R. S. Sec. 4888, held that his amendment added new matter beyond the scope of the device described in the application as filed, in consequence of which the appellant might take no benefit therefrom. Assuming that we sustained certain claims of his patent only by reading into them the flexible web element, it reversed our decision as to Gulick, and since Maynard neither claims nor describes flexible webs, it likewise reversed our decision as to its validity and infringement. Reciting, however, that since it had been thought by us that full recovery could be had by the appellants under the two patents adjudicated, we did not decide other questions involved in the appeals, it remanded the causes to us for further proceedings "with respect to such claims of the patents in suit as appellant below submitted to that court for adjudication." Upon petition for rehearing and clarification, it added to the direction for judgment the following: "On the remand the Court of Appeals will be free to consider whether the amendments to the Gulick application rendered void the patent issued upon it, and to consider all questions affecting the validity and infringement of the claims in suit of the Gulick and Maynard patents, but without including web flexibility or laterally flexible webs as an element in the combinations patented [illegible]."

Controversy has arisen over the scope of the remand, the appellee contending that we are precluded from consideration of the Schmiedeknecht and Mooers patents [illegible] dismissed as to them, albeit without [illegible] they may be brought to us for consid[illegible] new actions. The order of remand is, however [illegible], requiring no interpretation. We are directed to take further proceedings with respect to such claims of the patents in suit as appellants submitted

to us for adjudication, not merely in respect to those adjudicated. The phrasing of the amended direction is one of enlargement and clarification and not of limitation. That decrees have been entered below dismissing the bills as to the three patents not considered is of no moment. These decrees are brought into question in appeals 8094, 8095 and 8096 here involved. If they are in conflict with conclusions now reached they must be set aside and our mandates recalled, just as they must be set aside as in conflict with decision above. We hold that the remand operates to reopen the entire cause except insofar as questions necessary to decision have been decided by the Supreme Court and insofar as our own conclusions have not there been held erroneous and so constitute the law of the case.

The first question that confronts us is in respect to the validity of the claims of the Gulick and Maynard patents as circumscribed since we are now obliged to consider them without reading into them web flexibility or laterally flexible webs as an element, and in this connection it seems immaterial whether we read an element into them or merely construed an existing element as having in its environment a given characteristic. We recognized in our first opinion that Gulick was for a combination of elements, many if not all of which were old. Yet the combination appeared to us to be novel and to denote invention since a new result was secured in consequence of a nicely balanced flexibility of piston skirt, permitting successful operation at minute clearances without bending concentration at any point to impair ruggedness, and so distinguishing from Franquist and other pistons. In a case not free from doubt, since probably no one has seen an automobile piston reciprocating in its cylinder under operating conditions, the success of the commercial embodiment of Maynard, comprehending what was then conceived to be Gulick's basic concept, after so much failure, clearly appeared to denote that somewhere was invention. But the Gulick conception as we then considered it was of balanced flexibility derived from interplay of yielding skirt periphery and flexing supporting webs in response to the mechanical force of the cylinder wall and the thermal expansion of the piston head. The combination we are now obliged to consider is one with rigid webs opposing their rigidity to the resiliency of a skirt slotted to accommodate itself to forces to which practically it may not yield. This is not the combination we held to be valid. It is not the combination to which those most captious and skilled in the industry gave

tribute, to the end that all our doubt as to validity was resolved. We are constrained to hold all of the claims in suit of Gulick invalid as marking no inventive step over prior art. It therefore becomes unnecessary to consider whether his amendments voided his patent since the direction in this respect is but permissive and not imperative. It likewise becomes unnecessary to consider the effect of the disclaimer filed since decision above.

In Maynard there was no emphasis on rigidity of web construction such as was found by the Supreme Court in Gulick, but we are compelled nevertheless to view the Maynard combination as one failing to disclose cooperation of flexible webs with vertical and longitudinal slotting to secure the balanced flexibility conceived to reside in Gulick, and constituting therein a basic achievement, and since it is apparent that details of construction recited by us as disclosing a piston lighter and more economical of manufacture than Gulick and more rugged and durable than Jardine made no impression upon the court as marking inventive steps over prior art, we are likewise constrained to hold the claims of Maynard in suit invalid.

In the conviction that the long search for a solution of the alminum piston problem by engineers of great ability, their repeated failures, and the ultimate success of the Aluminum Company's commercial device point with persuasiveness to the fact that somewhere in the search one, with the spark of genius denied the skilled mechanic, contributed to the art the thought that brought achievement out of failure, we reconsider the Jardine patent, for though we are as sensitive as is the Court of Appeals of the Second Circuit [*Buono* v. *Yankee Maid Dress Corp.*, 77 Fed. (2d) 274, 276], to "the high standard demanded for invention by the decisions of the Supreme Court in recent years," attested by many of our more recent decisions, yet we also share Judge Learned Hand's understanding that the Supreme Court has not departed from the principle that recourse must be had in doubtful cases to the history of the art for the interpretation of claims and the existence of invention.

The patent to Jardine, 1,763,523, was issued June 10, 1930, upon an application originally filed March 11, 1920, prior to the filing of the Gulick amendment in 1922, now held to be invalid. Jardine with great clarity and in precise detail explains the principle of operation of his machine and the flexibility of its webs. The knowledge that was not Gulick's or was by him concealed, is clear to Jardine and by him proclaimed. "The webs 6 and

guide segments preferably are so designed that this displacement of the segment 10, $10^a$, is permitted by virtue of a bending of the webs 6 at points remote from the guide segments. To this end, as shown in Fig. 4, the thickness of the guide segments is increased toward the webs 6 and the webs 6 are decreased in thickness from the guide portions inward toward the bosses to points in line with the inner ends of the slot $11^a$. This gives in effect a cantilever structure weakest at its support. . . . Thus the reaction force of the cylinder wall on the outer faces of the guide segments as the piston expands tends to cause bending of the webs 6 along said line 13. Due to the bending of the web sections 6 and the forcing together of each pair of segments, the guide part of the piston may undergo a considerable thermal expansion without a corresponding increase in the outer diameter thereof and thus a small initial clearance can be used without danger of scoring or seizure of the piston."

Jardine is also the first to refer specifically to an "aluminum alloy piston," and he states that one embodying his invention "can be fitted to the engine cylinder with a very small clearance, and that compensation for the relatively large thermal expansion of the guide section of the piston is provided by the displacement of the guide segments which results from the reaction force of the cylinder wall on the outer faces of the guides." It is true that the drawings of Jardine depict what is known as the slipper type of piston, illustrated also in the patent to Ricardo, No. 1,294,833, but his invention is not limited to that type, for he says: "It is to be understood that the invention is essentially applicable to other forms of construction."

While the specimen claims of Jardine 1, 8 and 11, though reciting the web as an element do not incorporate therein the property of flexibility, yet in the light of the description they must be so interpreted, for it is clear that the Supreme Court in reversing our decision departs not at all from the rule that claims must be read in the light of the specification, since it is pointed out with particularity in respect to Gulick that his specifications point to no inadequacy in the structure or function of webs of the prior art which would be remedied by the webs specified, and to no function to be performed by them other than as a means of connecting and holding head and skirt so as to maintain the air gaps between them and to support the wrist pin bearings. Jardine repels this criticism of the Gulick application. It is also pointed out that Gulick failed to explain the principle of

his machine so as to distinguish it from the prior art. Jardine points to prior art failure. "I have found," he says, "that these difficulties can be overcome by constructing a piston with its skirt or guide portion supported and slotted or divided in a manner to permit deformation and deflection of parts thereof without interfering with the performance of the essential functions of the respective parts."

To invalidate Jardine the appellees rely mainly upon the Long piston and Long's patent No. 1,872,772, upon an application prior to Jardine's, and emphasis is placed upon the observation of the court to the effect that the Long piston, with webs concededly flexible laterally, was in commercial use in 1922. This brings us to a consideration of the contention, vigorously urged by the appellants, that the Supreme Court having applied to the sufficiency of disclosures made by Gulick and Maynard the so-called strict rule of construction, an equally strict rule must be applied to prior art. To this the appellees reply that there is a distinction between the teachings of a prior art patent or publication and a prior use. They concede that the description in patent or publication must be complete when read in connection with the prior art as one skilled in the art would read it, but urge that when it comes to a prior use, and an article is in existence so that it may be duplicated, it is immaterial whether those skilled in the art knew or were unaware of its characteristics.

Recognizing distinction between what may be disclosed in a patent and what may appear to the understanding of those skilled in the art when it reaches commercial embodiment and so may be physically reproduced, yet it would seem to us that nothing is prior art, at least in respect to function, unless its function is understood by those skilled in the art. Otherwise there would be little support in reason for the rule that novelty is not negatived by any prior accidental occurrence or production the character and function of which was not recognized until later than the date of the patented invention sought to be anticipated thereby, 1 Walker, 6th Ed. Sec. 106, or the further rule that novelty is not negatived by anything which was neither designed nor apparently adapted, nor actually used, to perform the function of the thing covered by the patent, Idem, Sec. 107. Nor is the observation of the court that a Long piston was in commercial use in 1922, the webs of which were concededly flexible, to be taken as a conclusion that the webs were flexible in use or that their flexibility, cooperating with other re-

silient elements, was then understood, however clear it may later have come to be. The Long patent did not disclose flexible webs. Since the argument that the webs of Gulick were laterally flexible to the understanding of those skilled in the art was rejected, so must we reject inference that prior to Jardine the art understood the webs of Long to be flexible in the absence of clearly convincing evidence that they were known to have that quality. Moreover, the Long patents recite that the separated portions of the skirt are rigidly held against bending to the forcing thrust of the piston. A Long piston was introduced to the industry by advertisement in *The Motor World,* December, 1921. It was installed in the Franklin automobile, and use at a clearance of .005 was set forth in a service bulletin. The evils following clearance so great are sufficiently recited in our former opinion, and the announced clearance negatives the thought either of web flexibility or of its understanding by the art.

It is said that pistons could not in an air cooled motor as was the Franklin, be machined to the minute clearance possible in water cooled motors. If true, it follows that Long contributed little to the solution of a problem whereby successful operation of an aluminum piston in an iron cylinder at clearances of .002 or less was achieved. It should, moreover, be noted that Long was a worker in the piston art for a considerable period. Three of his patents are in the record. It is conceded that No. 1,872,772 was his best effort, yet the structures urged to anticipate Jardine were devices prior to it, and while they may have had some commercial history, his latest patent still failed to describe or claim web flexibility.

Hartog, in his patent No. 1,842,022, prior to Jardine, claims internal yielding ribs, and means for yieldingly connecting skirt sections with the head. It seems clear from the Hartog description and drawings that his thought was of a springing resiliency in arcuate extensions of his skirt sections, and not of the bending or flexing of straight ribs so proportioned as to yield to the thermal expansion of the bosses on the cantilever principle, and that he did not disclose Jardine's mode of operation. There is little in the record to aid us to an understanding of Hartog. The experts did not discuss it, and the appellees appear to place no great reliance upon it. It is a mere paper patent without influence upon the art, and it is difficult, if not indeed impossible, to comprehend its mode of operation or whether it is operable at all, since he describes a piston skirt of greater diameter than the cylinder, mechanically compressible when

cold, to fit tightly therein. Hartog taught nothing to Jardine.

The specimen claims 1, 8 and 11 of the Jardine patent are valid. Since our conclusion in this respect is based upon the concept of a combination with balanced skirt flexibility due to cooperation of longitudinal and vertical slotting with flexing webs supporting retracted bosses and connected to a skirt thereby made responsive to physical compression and thermal expansion so as to permit of minute clearances between piston and cylinder, a concept perceived in Gulick as amended and minus amendment no longer perceived, and since this combination with modifications which may improve but do not destroy it appears in Jardine, and since it is the combination that appears in the commercial piston of the Aluminum Company of America[2] responding to Maynard's specific form and in such form reproduced by Sterling Products Co., in exhibit I, sold by the appellees, we hold that the latter infringes claims 1, 8 and 11 of Jardine. As we were unable in our first decision to find Gulick's complete concept, as we then understood it, in other accused structures, so are we now unable to find in them Jardine's concept, and we hold they do not infringe.

The Mooers patent 1,402,309 was not greatly stressed in the earlier briefs or argument. It is not strongly urged now. It is contended that Mooers disclosed the scheme for converting heat into mechanical energy and diverting expansion through this energy into relieved spaces limiting expansion in those unrelieved. But if this is the teaching of Mooers it must be derived from inferences not permitted to be drawn from Gulick and Maynard, and without such interpretive approach the conclusion must be that the Mooers disclosure is incomplete. We hold its specimen claims to be invalid.

Schmiedeknecht patent 1,256,265 has now expired. It discloses no web flexibility cooperating with other elements of resiliency to achieve the balanced flexibility perceived in Jardine on the basis of which alone the latter is thought to be valid, and we sense no advance in Schmiedeknecht that distinguishes it from the prior art in aspects beyond the skill of the art. It does not invalidate Jardine and is itself invalid.

Appeals 7223, 7224 and 7225, are from decrees in the same causes determined by our previous opinion, and

[2] We are no more concerned than was the master below with the character of the monopoly sought by the appellants' licensee. Monopoly is the essence of the inventor's reward, and an assignable property right. Its control, abridgment or destruction lies wholly within the legislative province.

responsive to our mandates therein. This unusual situation resulted from the denial of a petition for certiorari to our first judgment and denial of a petition for rehearing thereon. It was doubtless assumed below that the cases had reached finality. The decrees adjudicated certain claims of Gulick and Maynard valid and infringed by exhibit I, and granted the usual injunction and order for accounting. The issue as to them is now moot, and our mandates must be recalled and the decrees set aside.

The appellants, however, contend that the decrees should not have provided injunctive relief to the appellee Trust Company on the ground that it is the bare title holder of the patents in suit, with the Aluminum Company of America as exclusive licensee the only party entitled to seek it. They thereby deny our power to grant restraint in respect to claims now found valid and infringed. The master, however, concluded that the Trust Company holds the entire right, title and interest to all patents in suit except an undivided half of the Maynard patent, that it might sue in its own name without joining with it the beneficiaries under the trust, and that the Aluminum Company is a non-exclusive licensee and not a necessary party to the suit. No exception was taken to his findings or conclusions in this respect, and they were not challenged when the case was first before this court. The right of appellees to injunction was no longer in issue when we gave direction for mandate. It is now the law of the case that appellees are entitled to an injunction restraining infringements of any claims of any of the patents in suit now adjudicated as valid and infringed.

A second objection to the decrees, and so impliedly to similar substituted decrees, is that they were not specific. It is urged that they should have recited with particularity the exhibits held to infringe, and those held not to infringe. There is merit to the first phase of the contention since an injunctional order should be as explicit as the case permits. There is no virtue in the second, since decision carries its own vindication of unsuccessfully assailed structures and no affirmative relief by appellants was prayed.

The decrees below will be set aside upon the recall of the mandates. A new decree will be entered in each case adjudicating claims 1, 8 and 11 of Jardine patent valid and infringed by exhibit I. It will provide for an injunction restraining manufacture, use and sale of exhibit I, and all substantial equivalents thereof, and grant the

usual accounting for past infringement by exhibit I or its equivalents. It will deny relief as to every other claim of any of the patents in suit, and as against all other accused structures. Costs of the appeals will be divided.

Reversed and remanded for further proceedings in conformity herewith.